



PUBLIC NOTICE

Federal Communications Commission
445 12th St., S.W.
Washington, D.C. 20554

News Media Information 202 / 418-0500
Internet: <http://www.fcc.gov>
TTY: 1-888-835-5322

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OET Clarifies Emission Mask Measurements for DTV Transmitters

The out-of-channel emission masks for full service DTV transmitters are specified in Section 73.622(h) of the Commission's rules and, for low power stations, Section 74.794 (47 C.F.R. §§ 73.622(h) and 74.794). This notice clarifies those rules and provides guidance for conducting measurements of the out-of-channel emissions of DTV transmitters.

The out-of-channel emissions requirements for full service and low power DTV transmitters are specified for a measurement bandwidth of 500 kHz and are defined as attenuations relative to the total in-channel power. The rules also state that measurement bandwidths narrower than 500 kHz are permitted if appropriate correction factors are applied.

Direct measurements of such emissions with a 500 kHz resolution bandwidth (RBW) may not be possible because 500 kHz RBW may not be available on available measurement equipment. In addition, because resolution filters on spectrum analyzers do not have "brick wall" responses, leakage of the main DTV signal into the skirts of the resolution filter can corrupt out-of-channel emission measurements sufficiently to cause an apparent failure to satisfy the mask; consequently, a sufficiently low RBW must be selected to prevent main signal leakage into the filter skirts from causing such an apparent failure. Depending on shape factor of the analyzer's resolution filter, proper measurements in the 500 kHz window adjacent to each channel edge may require an RBW of 30 kHz, 10 kHz, or even less.

Considering the above, the Commission will allow compliance with the DTV full service or low power masks to be demonstrated by either of two methods.

Method 1: Scale the measured power to a 500 kHz bandwidth based on $10 \log(500 \text{ kHz/equivalent noise bandwidth of the resolution filter})$ and compare each point on the spectrum to the emission mask; or, equivalently, scale the measured attenuation by $10 \log(\text{equivalent noise bandwidth of the resolution filter}/500 \text{ kHz})$ and compare each point.

Method 2: Sum the power across a 500 kHz window in order to implement an effective measurement bandwidth of 500 kHz; this power level is then compared to the mask value computed at the center frequency of the 500 kHz band.

Method 2 may be performed either by manually summing the measurements or by using the band power function on a spectrum analyzer or vector signal analyzer. In implementing Method 2, it is sufficient to measure a contiguous sequence of 500 kHz windows.

A single method may be used for all measurements, or, if desired, one of the above methods may be employed in the 500 kHz window adjacent to each channel edge and the other for all measurements further from the band edge. Similarly, a single RBW may be used for all out-of-channel measurements, or, if desired, a larger RBW may be used in the regions beyond 500 kHz from the channel edge than that used in the 500 kHz adjacent to the each channel edge in order to speed sweep times or to limit the number of resolution windows that must summed when performing manual integration across a 500 kHz span. In any case resolution bandwidth must be no greater than 500 kHz.

In selecting sweep span and resolution bandwidth on spectrum analyzers with digital displays, care must be taken to ensure that the frequency bin width on the analyzer [$\text{span}/(\# \text{ of points in the spectrum} - 1)$] is less than or equal to the RBW. This caution does not apply to analyzers that have fully analog displays (typically built before the mid 1970's).

It should be noted that, depending on the type of spectrum analyzer used, additional correction factors may be necessary to accurately represent the average power of the noise-like DTV transmission.

For additional information regarding this notice, contact Steve Martin, Technical Research Branch, Office of Engineering and Technology, at (301)362-3052. A detailed procedure for measuring DTV emission spectra is under development by the IEEE. Information regarding that standard can be obtained at the following URL:
<http://www.ieee.org/organizations/society/bt/stdns.html>

Chief, Office of Engineering and Technology

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